

# Claims

- [c1] An optical engine for a head-mounted display capable of forming images before man's eyeballs to be watched, comprising:
- a first polarizer;
  - a light source emitting rays toward the first polarizer;
  - an LCoS device for generating the images and reflecting reflective rays from the first polarizer to penetrate the first polarizer;
  - a concave mirror; and
  - a beam splitter for refracting the rays of the images having penetrated the first polarizer to the concave mirror, which then magnifies the images and projects the magnified images on the beam splitter to be watched.
- [c2] The optical engine for a head-mounted display of Claim 1, wherein an included angle between a luminous surface of the light source and a surface of the LCoS device is in a range of 15 to 25 degrees, and an included angle between a surface of the first polarizer and a surface of the LCoS device is in a range of 25 to 35 degrees.
- [c3] The optical engine for a head-mounted display of Claim 1, wherein a luminous surface of the light source is per-

pendicular to the LCoS device, and an included angle between the first polarizer and the surface of the LCoS device is substantially 45 degrees.

[c4] The optical engine for a head-mounted display of Claim 1, further comprising a pre-polarizer placed between the beam splitter and the eyeballs.

[c5] The optical engine for a head-mounted display of Claim 1, wherein the light source includes:  
a light generator for generating visible rays;  
a pre-polarizer allowing a part of the visible rays in a certain polarized direction to pass through; and  
a Fresnel lens for changing the rays passing through the pre-polarizer into parallel rays.

[c6] The optical engine for a head-mounted display of Claim 5, wherein the light generator is composed of a red LED, a blue LED and a green LED.

[c7] The optical engine for a head-mounted display of Claim 1, wherein the first polarizer is substantially parallel to the beam splitter.

[c8] The optical engine for a head-mounted display of Claim 7, wherein the first polarizer and the beam splitter can be replaced with a polarized beam splitter.

- [c9] The optical engine for a head-mounted display of Claim 1, wherein a coated film is formed on the surface of the beam splitter.
- [c10] The optical engine for a head-mounted display of Claim 1, wherein the concave mirror is a non-spherical concave mirror.
- [c11] An optical engine for a head-mounted display capable of forming images before man's eyeballs, comprising:  
a first polarizer;  
a light source for emitting rays toward the first polarizer;  
an LCoS device for generating the images and reflecting reflective rays from the first polarizer to penetrate the first polarizer;  
a concave mirror; and  
a beam splitter reflecting the rays of the images having penetrated the first polarizer to the concave mirror, which magnifies the images and has the magnified images pass through the beam splitter to the eyeballs.
- [c12] The optical engine for a head-mounted display of Claim 11, wherein an included angle between a luminous surface of the light source and a surface of the LCoS device is in a range of 15 to 25 degrees, and an included angle between the surface of the first polarizer and the surface of the LCoS device is in a range of 25 to 35 degrees.

- [c13] The optical engine for a head-mounted display of Claim 11, further comprising a pre-polarizer placed between the beam splitter and the eyeballs.
- [c14] The optical engine for a head-mounted display of Claim 11, wherein the light source includes:  
a light generator for generating visible rays;  
a pre-polarizer allowing a part of the visible rays in a certain polarized direction to pass through; and  
a Fresnel lens for changing the rays passing through the pre-polarizer into parallel rays.
- [c15] The optical engine for a head-mounted display of Claim 14, wherein the light generator is composed of a red LED, a blue LED and a green LED.
- [c16] The optical engine for a head-mounted display of Claim 11, wherein the concave mirror is a non-spherical concave mirror.
- [c17] A head-mounted display, comprising:  
at least one display chamber having an optical engine therein, wherein the optical engine includes:  
a first polarizer;  
a light source for emitting rays toward the first polarizer;  
an LCoS device for generating images and reflecting reflective rays from the first polarizer to penetrate the

first polarizer;  
a concave mirror; and  
a beam splitter refracting the rays of the images having penetrated the first polarizer to the concave mirror, which magnifies the images and projects the magnified images on the beam splitter to be watched; and  
a frame for holding the display chamber.

[c18] The head-mounted display of Claim 17, further comprising an earpiece fixed on the frame.

[c19] A head-mounted display, comprising:  
at least one display chamber having an optical engine therein, wherein the optical engine includes:  
a first polarizer;  
a light source for emitting rays toward the first polarizer;  
an LCoS device for generating images and reflecting reflective rays from the first polarizer to penetrate the first polarizer;  
a concave mirror; and  
a beam splitter reflecting the rays of the images having penetrated the first polarizer to the concave mirror, which magnifies the images and redirects the magnified images through the beam splitter to the eyeballs;  
and  
a frame for holding the display chamber.

[c20] The head-mounted display of Claim 19, further comprising an earpiece fixed on the frame.